Beaver Dams Creek Executive Summary

CWCB STAFF INSTREAM FLOW RECOMMENDATION
January 27-28, 2025

UPPER TERMINUS:	headwaters in the vicinity of UTM North: 4241940.00 UTM East: 229120.87
LOWER TERMINUS:	confluence with East Fork Dry Creek at UTM North: 4246758.01 UTM East: 229778.94
WATER DIVISION/DISTRICT:	4/68
COUNTY:	Ouray
WATERSHED:	Uncompahgre
CWCB ID:	21/4/A-001
RECOMMENDER:	Colorado Parks and Wildlife (CPW)
LENGTH:	3.29 miles
FLOW RECOMMENDATION:	0.3 cfs (09/01 - 02/29) 0.5 cfs (03/01 - 03/31) 2.6 cfs (04/01 - 04/30) 2.8 cfs (05/01 - 06/30) 1.7 cfs (07/01 - 07/31) 0.6 cfs (08/01 - 08/31)

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

BACKGROUND

Colorado's General Assembly created the Instream Flow and Natural Lake Level Program in 1973, recognizing "the need to correlate the activities of mankind with some reasonable preservation of the natural environment" (see 37-92-102 (3), C.R.S.). The statute vests the Colorado Water Conservation Board (CWCB or Board) with the exclusive authority to appropriate and acquire instream flow (ISF) and natural lake level (NLL) water rights. Before initiating a water right filing, the Board must determine that: 1) there is a natural environment that can be preserved to a reasonable degree with the Board's water right if granted, 2) the natural environment will be preserved to a reasonable degree by the water available for the appropriation to be made, and 3) such environment can exist without material injury to water rights.

The information contained in this Executive Summary and the associated supporting data and analyses form the basis for staff's ISF recommendation to be considered by the Board. This Executive Summary provides sufficient information to support the CWCB findings required by ISF Rule 5i on natural environment, water availability, and material injury. Additional supporting information is located at: https://cwcb.colorado.gov/2025-isf-recommendations.

RECOMMENDED ISF REACH

CPW recommended that the CWCB appropriate an ISF water right on a reach of Beaver Dams Creek at the ISF Workshop in January 2020. Beaver Dams Creek is located within Ouray County and is approximately thirteen miles southwest of the City of Montrose (See Vicinity Map). The stream originates on the Uncompahgre Plateau and flows north until it reaches the confluence with East Fork Dry Creek. Beaver Dams Creek is a tributary to East Fork Dry Creek, a tributary to Dry Creek which is a tributary to the Uncompahgre River.

The proposed ISF reach extends from headwaters downstream to the confluence with East Fork Dry Creek for a total of 3.29 miles. The proposed reach is mainly on public lands managed under the Uncompahgre National Forest with approximately 15% of the bottom of the reach on private land (See Land Ownership Map). CPW is interested in protecting this stream to preserve the natural environment which includes native Colorado River cutthroat trout.

OUTREACH

Stakeholder input is a valued part of the CWCB staff's analysis of ISF recommendations. Currently, more than 1,100 people subscribe to the ISF mailing list. Notice of the potential appropriation of an ISF water right on Beaver Dams Creek was sent to the mailing list in November 2024, March 2024, March 2023, March 2022, March 2021, and March 2020. Staff sent letters to identified landowners adjacent to Beaver Dams Creek based on information from the county assessor's website. A public notice about this recommendation was also published in the Ouray County Plaindealer on December 12, 2024.

Staff presented information about the ISF program and this recommendation to the Ouray County Board of County Commissioners on October 8, 2024. In addition, staff spoke with Eric Weig, District 68 Water Commissioner, on June 26, 2024 regarding water availability, which confirmed staff's understanding of hydrology and adminstative practices on the unnamed tributary to East Fork Dry Creek.

NATURAL ENVIRONMENT

CWCB staff relies on the recommending entity to provide information about the natural environment. In addition, staff reviews information and conducts site visits for each recommended ISF appropriation. This information provides the Board with a basis for determining that a natural environment exists.

Beaver Dams Creek is a first order headwater stream and a tributary to East Fork Dry Creek. It flows northerly off the Uncompahgre Plateau towards the City of Montrose through dense forest of coniferous pine. Beaver Dams Creek has a high-gradient, confined channel with substrate that ranges from large cobble to gravel and sand. Fish habitat is complex with wood and cover in the channel, as well as some side channel features. Cover habitat includes undercut banks, large woody debris, and step-pools. The creek supports a healthy riparian environment with ample overhead shading supporting suitable stream temperatures. The creek supports a diverse macroinvertebrate community with multiple species of mayfly, diptera, and caddisfly observed in the field.

Beaver Dams Creek supports a self-sustaining population of Colorado River cutthroat trout (CRCT) of the Gunnison Basin lineage (Table 1). The population is considered a core conservation population indicating high genetic purity of the cutthroat trout and limited introgression with non-native trout species. CRCT are a state species of special concern and considered a federally sensitive species (CPW, 2015). Length-frequency data indicates multiple age classes which reinforces that the cutthroat trout in Beaver Dams Creek are a self-sustaining population. CPW staff observed fish during 2022 field work.

Table 1. List of species identified in Beaver Dams Creek.

Species Name	Scientific Name	Status
Colorado River Cutthroat Trout- Gunnison Basin Lineage	*Oncorhynchus clarkii pleuriticus*	State - Species of Special Concern

ISF QUANTIFICATION

CWCB staff relies on the biological expertise of the recommending entity to quantify the amount of water required to preserve the natural environment to a reasonable degree. CWCB staff performs a thorough review of the quantification analyses completed by the recommending entity to ensure consistency with accepted standards.

Quantification Methodology

CPW staff used the R2Cross method to develop the initial ISF recommendation. The R2Cross method is based on a hydraulic model and uses field data collected in a stream riffle (CWCB, 2022; CWCB, 2024). Riffles are the stream habitat type that are most vulnerable to dry if streamflow ceases. The data collected consists of a streamflow measurement, a survey of channel geometry and features at a cross-section, and a survey of the longitudinal slope of the water surface.

The R2Cross model uses Ferguson's Variable-Power Equation (VPE) to estimate roughness and hydraulic conditions at different water stages at the measured cross-section (Ferguson, 2007; Ferguson, 2021). This approach is based on calibrating the model as described in Ferguson (2021). The model is used to evaluate three hydraulic criteria: average depth, average velocity,

and percent wetted perimeter. Maintaining these hydraulic parameters at adequate levels across riffle habitat types also will maintain aquatic habitat in pools and runs for most life stages of fish and aquatic macroinvertebrates (Nehring, 1979). CPW staff use the model results to develop an initial recommendation for summer and winter flows. The summer flow recommendation is based on the flow that meets all three hydraulic criteria. The winter flow recommendation is based on the flow that meets two of the three hydraulic criteria.

The R2Cross method estimates the biological amount of water needed for summer and winter periods. The recommending entity uses the R2Cross results and its biological expertise to develop an initial ISF recommendation. CWCB staff then evaluates water availability for the reach typically based on median hydrology (see the Water Availability section below for more details). The water availability analysis may indicate less water is available than the initial recommendation. In that case, the recommending entity either modifies the magnitude and/or duration of the recommended ISF rates if the available flows will preserve the natural environment to a reasonable degree or withdraws the recommendation.

Data Collection and Analysis

CPW collected R2Cross data at two transects for this proposed ISF reach (Table 2 and Site Map). Results obtained at more than one cross-section are averaged to determine the R2Cross flow rate for the stream reach. The R2Cross model results in a winter flow of 0.49 cfs and a summer flow of 2.8 cfs. R2Cross field data and model results can be found in the appendix to this report.

Table 2. Summary of R2Cross cross-section measurements and results for Beaver Dams Creek.

Date, XS #	Top Width (feet)	Streamflow (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
05/25/2022, 1	7.9	1.9	0.39	2.1
05/25/2022, 2	10.1	1.9	0.59	3.5
			0.49	2.8

ISF Recommendation

CPW recommends the following flows based on R2Cross modeling analyses, biological expertise, and staff's water availability analysis.

0.3 cfs is recommended from September 1 to February 29; this flow rate has been reduced due to water availability limitations. This flow rate supports baseflow conditions and will maintain adequate wetted perimeter in the channel to provide sufficient holding habitats in pools and glides. This will support fish during the fall when they are transitioning to resting habitat in preparation for overwintering conditions.

0.5 cfs is recommended from March 1 to March 31 and meets two of three hydraulic criteria. This flow rate will support adequate depth and wetted perimeter to support fish as they begin to transition from overwintering resting habitat into more metabolic activity.

2.6 cfs is recommended from April 1 to April 30; this flow rate has been reduced due to water availability limitations. This flow rate follows the rising limb of the streams hydrograph and

maintains adequate wetted perimeter and depth, as well as higher velocities. It will support fish as they transition into more metabolic activity as ice cover decreases.

2.8 cfs is recommended from May 1 to June 30 and meets all three hydraulic criteria for summer flows during spring runoff through its recession. This flow rate will allow oxygenation and productivity of macroinvertebrates in riffles. This rate will support cutthroat trout as they are actively feeding and spawning.

1.7 cfs is recommended from July 1 to July 31; this flow rate has been reduced due to water availability limitations. This flow rate follows the falling limb of the streams hydrograph and maintains adequate depth and wetted perimeter that supports rearing and refuge habitats enabling feeding and growth of cutthroat trout.

0.6 cfs is recommended from August 1 to August 31; this flow rate has been reduced due to water availability limitations. This flow rate follows the falling limb of the streams hydrograph and will maintain adequate depth and wetted perimeter to provide sufficient habitat in riffles, runs, and pools, allowing fish movement between habitat types.

WATER AVAILABILITY

CWCB staff conducts hydrologic analyses for each recommended ISF appropriation to provide the Board with a basis for determining that water is available.

Water Availability Methodology

Each recommended ISF reach has a unique flow regime that depends on variables such as the timing, magnitude, and location of water inputs (such as rain, snow, and snowmelt) and water losses (such as diversions, reservoirs, evaporation and transpiration, groundwater recharge, etc.). This approach focuses on streamflow and the influence of flow alterations, such as diversions, to understand how much water is physically available in the recommended reach.

Staff's hydrologic analysis is data-driven, meaning that staff gathers and evaluates the best available data and uses the best available analysis method for that data. Whenever possible, long-term stream gage data (period of record 20 or more years) are used to evaluate streamflow. Other streamflow information such as short-term gages, temporary gages, spot streamflow measurements, diversion records, and regression-based models are used when long-term gage data is not available. CSUFlow18 is a multiple regression model developed by Colorado State University researchers using streamflow gage data collected between 2001 and 2018 (Eurich et al., 2021). This model estimates mean-monthly streamflow based on drainage basin area, basin terrain variables, and average basin precipitation and snow persistence. Diversion records are used to evaluate the effect of surface water diversions when necessary. Interviews with water commissioners, landowners, and ditch or reservoir operators can provide additional information. A range of analytical techniques may be employed to extend gage records, estimate streamflow in ungaged locations, and estimate the effects of diversions. The goal is to obtain the most detailed and reliable estimate of hydrology using the most efficient analysis technique.

The final product of the hydrologic analysis used to determine water availability is a hydrograph, which shows streamflow and the proposed ISF rate over the course of one year. The hydrograph will show median daily values when daily data is available from gage records;

otherwise, it will present mean-monthly streamflow values. Staff will calculate 95% confidence intervals for the median streamflow if there is sufficient data. Statistically, there is 95% confidence that the true value of the median streamflow is located within the confidence interval.

Basin Characteristics

The contributing basin of the proposed ISF on Beaver Dams Creek is 2.9 square miles, with an average elevation of 9,305 feet and average annual precipitation of 24.9 inches (See the Site Map). Beaver Dams Creek is a high elevation, steep gradient, snowmelt driven hydrologic system with a strong late summer monsoonal signal. The basin has natural streamflow conditions and is anthropogenically unaltered.

Water Rights Assessment

There are no diversions within the reach of Beaver Dams Creek recommended for an ISF. Three decreed spring water rights exist within the reach totaling less than 0.25 cfs in absolute rights. There is one USFS Federal Reserve reservoir right high in the reach appropriated in 1905 (WDID 6807021) though photographic review shows that no reservoir has been constructed. The lower terminus of the recommended reach is located at the upper terminus of an existing IFS on East Fork Dry Creek decreed in 05CW0151.

Data Collection and Analysis

Representative Gage Analysis

There are no current or historic gages on Beaver Dams Creek. Staff investigated nearby gages for similarities in basin characteristics and hydrology and found no gages were sufficiently similar to be used to estimate streamflow on Beaver Dams Creek.

Multiple Regression Model

The CSUFlow18 regression model predicts mean-monthly flow in Beaver Dams Creek and provides the best estimate for streamflow conditions.

Site Visit Data

CWCB staff joined CPW on a site visit during data collection for R2Cross modeling on 5/25/2022.

Water Availability Summary

The hydrograph shows CSUFlow18 results for mean-monthly streamflow and includes the proposed ISF rate (See Complete Hydrograph). The proposed ISF flow rate is below the mean-monthly streamflow. Staff concludes that water is available for appropriation on Beaver Dams Creek.

MATERIAL INJURY

If decreed, the proposed ISF on Beaver Dams Creek would be a new junior water right. This ISF water right can exist without material injury to other senior water rights. Under the provisions of section 37-92-102(3)(b), C.R.S., the CWCB will recognize any uses or exchanges of water in existence on the date this ISF water right is appropriated.

ADDITIONAL INFORMATION

Common Acronyms and Abbreviations

Term	Definition
af	acre feet
BLM	Bureau of Land Management
cfs	cubic feet per second
CWCB	Colorado Water Conservation Board
CPW	Colorado Parks and Wildlife
DWR	Division of Water Resources
HCCA	High Country Conservation Advocates
ISF	Instream Flow
NLL	Natural Lake Level
USGS	United States Geological Survey
USFS	United States Forest Service
XS	Cross section

Citations

Colorado Parks and Wildlife, 2015, State Wildlife Action Plan: A strategy for conserving wildlife in Colorado. https://cpw.widencollective.com/assets/share/asset/nbenjdfemj

Colorado Water Conservation Board, 2022, R2Cross model- User's manual and technical guide. Retrieve from URL: https://r2cross.erams.com/

Colorado Water Conservation Board, 2024, R2Cross field manual. Retrieve from URL: https://dnrweblink.state.co.us/cwcbsearch/0/edoc/224685/R2Cross%20Field%20Manual%202024.pdf

Eurich, A., Kampf, S.K., Hammond, J.C., Ross, M., Willi, K., Vorster, A.G. and Pulver, B., 2021, Predicting mean annual and mean monthly streamflow in Colorado ungauged basins, River Research and Applications, 37(4), 569-578.

Ferguson, R.I., 2007. Flow resistance equations for gravel- and boulder-bed streams. Water Resources Research 43. https://doi.org/10.1029/2006WR005422

Ferguson, R.I., 2021. Roughness calibration to improve flow predictions in coarse-bed streams. Water Res 57. https://doi.org/10.1029/2021WR029979

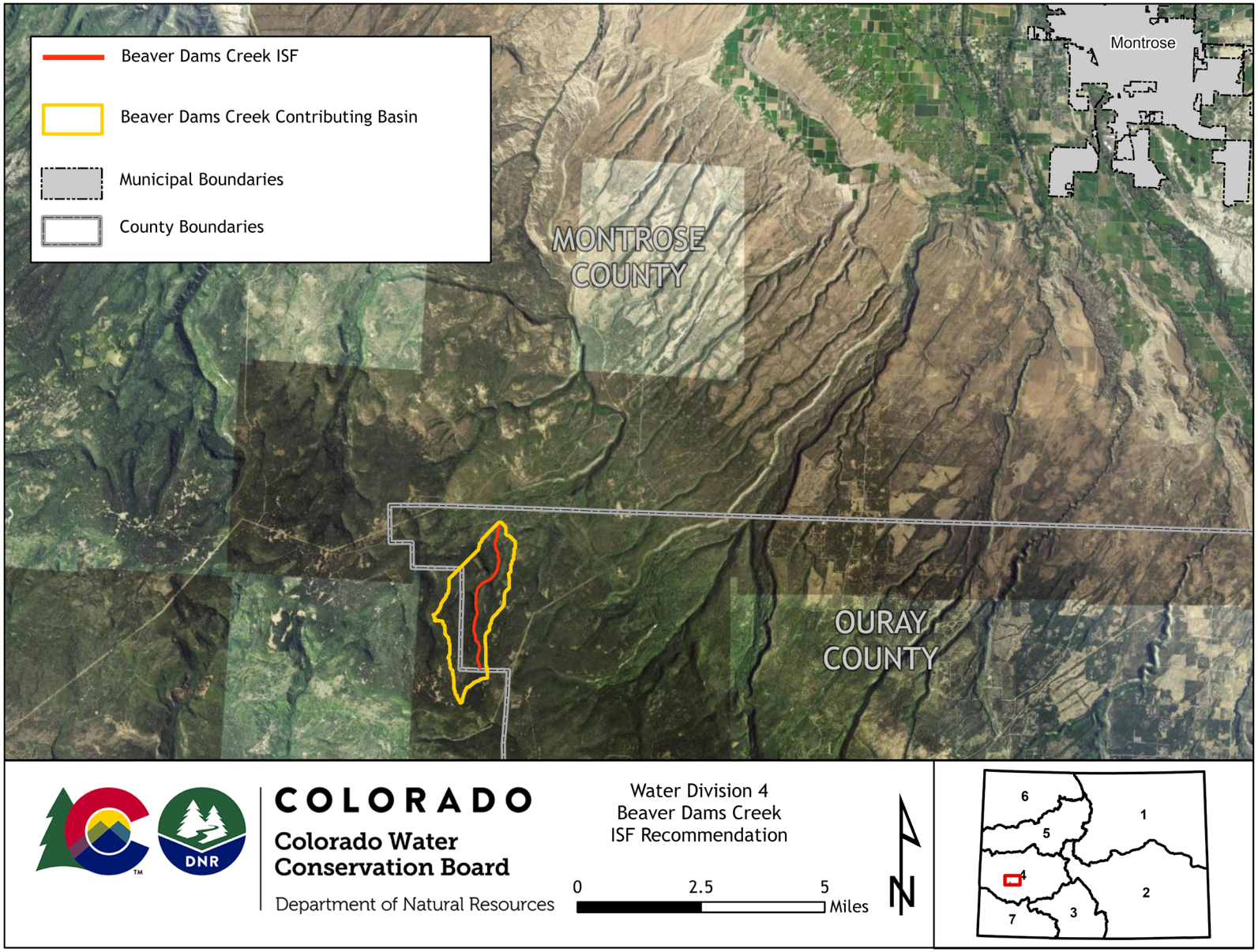
Nehring, B.R., 1979, Evaluation of instream flow methods and determination of water quantity needs for streams in the state of Colorado, Colorado Division of Wildlife.

Metadata Descriptions

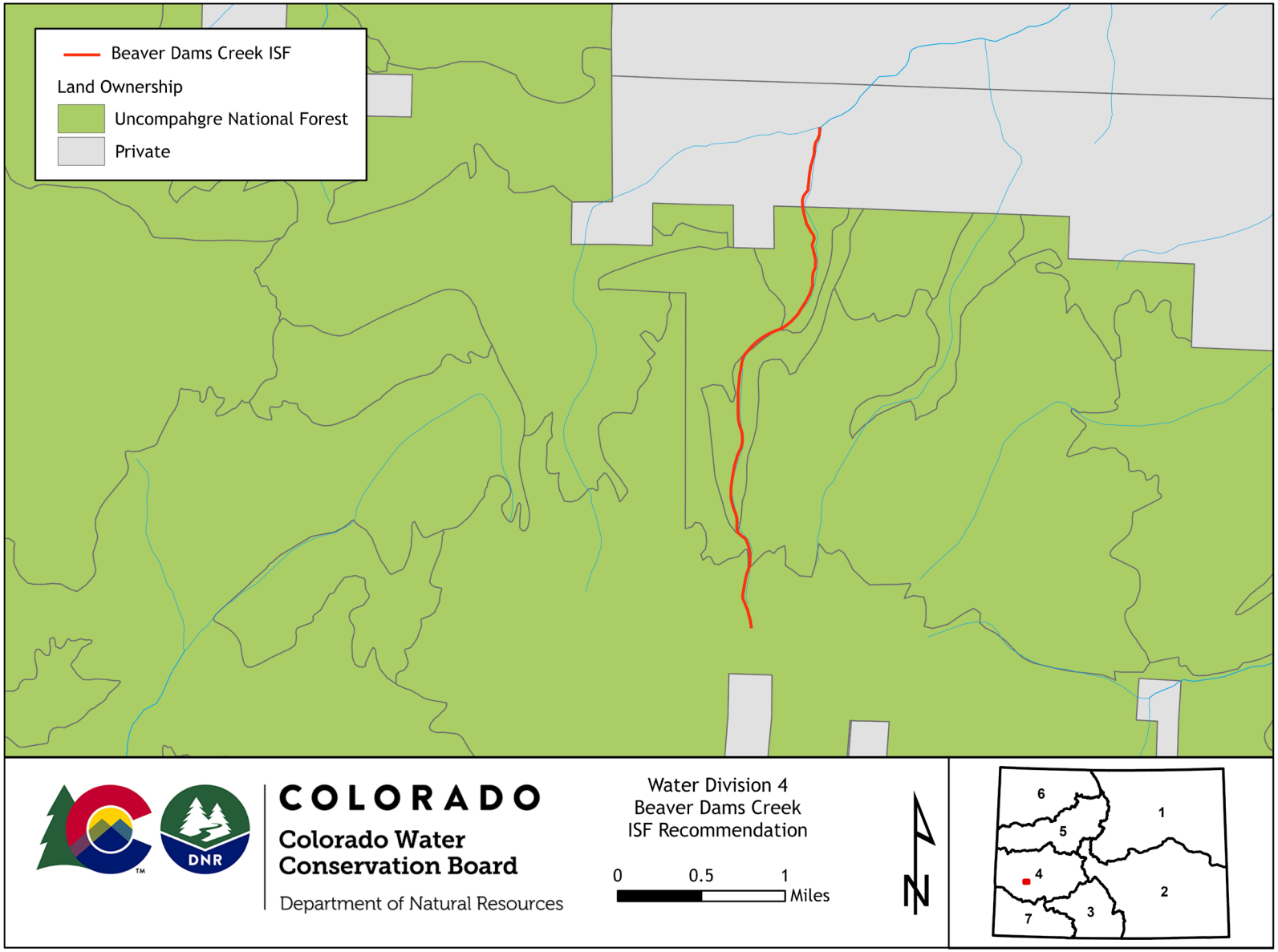
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

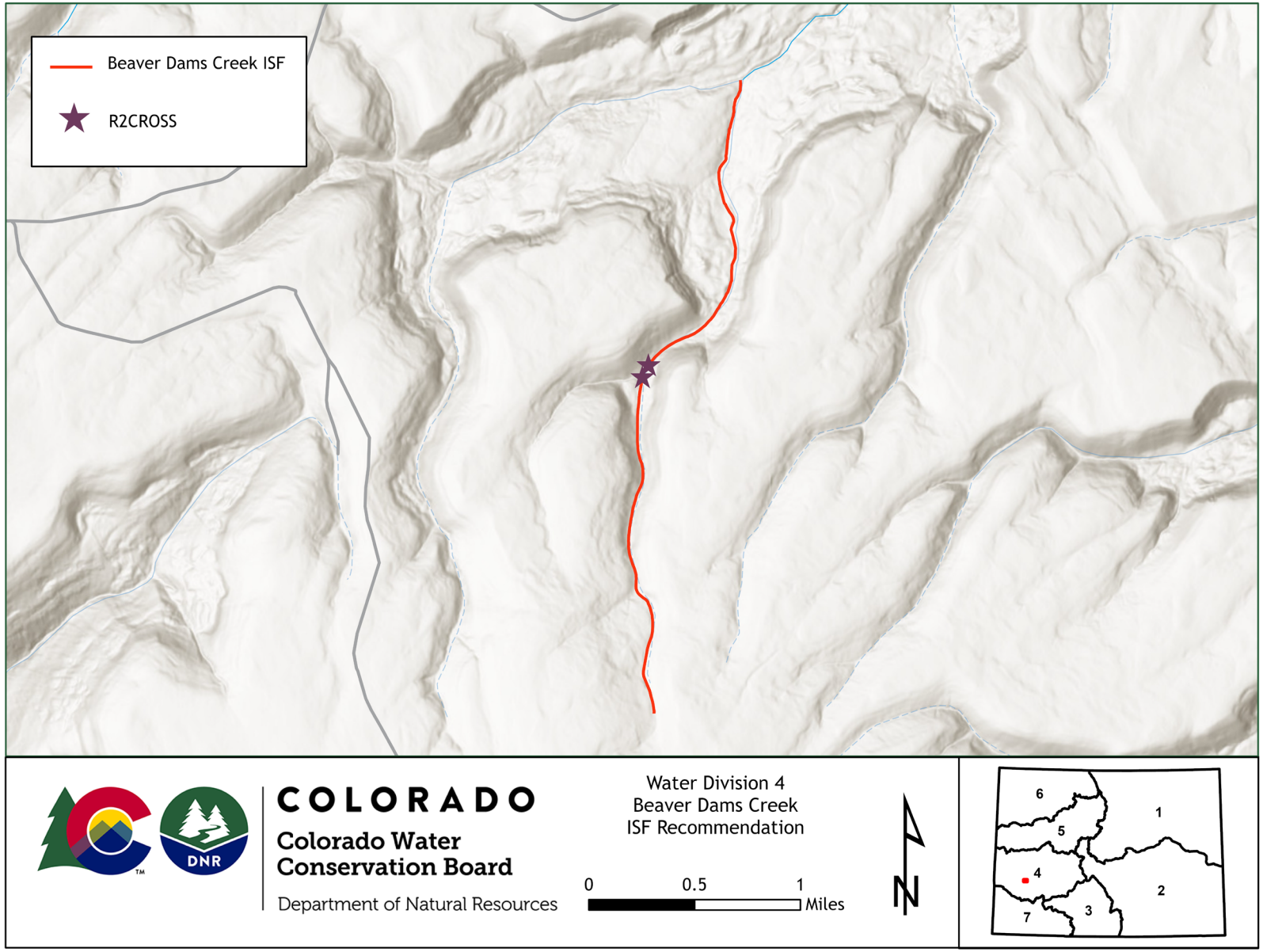
VICINITY MAP



LAND OWNERSHIP MAP



SITE MAP


Beaver Dams Creek ISF
R2CROSS
COLORADO
Colorado Water Conservation Board
Department of Natural Resources
Water Division 4
Beaver Dams Creek
ISF Recommendation
0
0.5
1
Miles
N
6
1
5
4
2
7
3

COMPLETE HYDROGRAPH